

# Homer Hadley Floating Bridge 2007 Random Watertight Inspection

Transportation Commission Resolution 398

January 10, 2008

## **Abstract**

This report is to address the condition of the watertight pontoons on Homer Hadley Floating Bridge. This is done by a visual inspection of the pontoons by Bridge Preservation Staff. Cell inspections found 3 of the 540 cells inspected had measurable amount of water in them. This bridge is watertight and is well maintained by its maintenance staff.

## Table of Contents

Abstract .....	ii
Table of Contents .....	iii
List of Tables .....	iii
List of Figures .....	iii
Inspection Report .....	1
Introduction .....	1
Inspection Procedure .....	1
Inspection Findings .....	2
Conclusions .....	3
Recommendations .....	4
Appendix .....	6
Appendix A-Field Notes .....	7
Appendix B-Pontoon Layouts .....	11
Appendix C-Bridge Layout .....	23
Appendix D-Pumping History .....	25

## List of Tables

Table 1. Pontoon Inspection History .....	1
Table 2. Summary of Findings .....	2

## List of Figures

Figure 1. Example of water removal tracking sheet .....	4
Figure 2. Repair Priority Matrix .....	5

## Inspection Report

### *Introduction*

In accordance with Transportation Commission Resolution 398, a random inspection of the Homer Hadley Floating Bridge (90/25N) was conducted (see Table 1). The purpose of this inspection was to assess the ability of the structure to remain watertight

**Table 1. Pontoon Inspection History**

1993	A, G, I, K, L, M, N, O, Q
1994	B, C, D, E, F, H, J, P, R
1995	A, G, I, K, L, M, N, O, Q
1996	B, C, D, E, F, H, J, P
1997	A, G, I, K, L, M, N, O, Q
1998	B, C, D, E, F, H, J, P, R
1999	A, G, I, K, L, M, N, O
2000	B, C, D, E, F, H, J, P, R
2001	A, G, I, K, L, M, N, O, Q
2002	B, C, D, E, F, H, J, P, R
2003	A, G, I, K, L, M, N, O
2004	B, C, D, E, F, H, J, P, R
2005	A, G, I, K, L, M, N, O, Q
2006	B, C, D, E, F, H, J, P, R-(A, K, L)*
2007	A, G, I, K, L, M, N, O, Q-(E, F)*
*	Cells were entered for repair verification

The inspection was conducted on December 13<sup>th</sup> 2007. The inspection team was comprised of Washington State Department of Transportation, Bridge Preservation staff members Eric Sniezak, P.E., Kengo Sakamoto, P.E., Andy Abbett, P.E., Darren Nebergall, P.E., Steve Dooley, Loren Wilson, Phillip Kelley, and Michael Smith.

Inspection notes are shown in Appendix A. Layouts showing the individual pontoons and the cells are shown in Appendix B. An overview map of the bridge is shown in Appendix C. Water removal from cells is shown in Appendix D.

### *Inspection Procedure*

The inspection consisted of visual surveys of the interiors of representative pontoon cells, access hatches, and bilge piping. Based on inspection frequency, nine of the eighteen pontoons were chosen and two other pontoons were entered to verify existing repairs.

Cells were classified as “Dry” if there was no puddled water over the majority of the floor area. “Trace” was defined as standing water less than 1 inch deep. Water depths of one inch or greater were recorded to the nearest half inch.

Some pontoons will have gravel ballast inside some cells. When encountered during the inspection, depth of gravel ballast has been measured and recorded in the notes.

### ***Inspection Findings***

Cells in pontoons A, E, F, G, I, K, L, M, N, O, and Q were inspected. Of the 540 cells inspected, 32 cells had a trace amount of water in them and 3 cells had 1" or more water in them (see Table 2).

**Table 2. Summary of Findings**

Pontoon	Dry	Trace	Measureable	Total
A	36	8	1	45
E*	4	1	0	5
F*	4	1	0	5
G	48	10	2	60
I	55	5	0	60
K	57	3	0	60
L	59	1	0	60
M	59	1	0	60
N	60	0	0	60
O	58	2	0	60
Q	65	0	0	65
Total	505	32	3	540
*pontoon entered for existing repair verification				

All of the cells appeared visually free of any significant structural deficiencies. Typically, many of the walls and ceilings of the pontoons have scattered hairline-leaching cracks. Monitor Cell locations: Pontoon A, Cell 5D-Trace amount of water was found. Pontoon G, Cell 6A-1.5" of water found.

One loose hatch door was found in Pontoon E between cells 9A and 9B. The door handle wheel is loose to the shaft in Pontoon F between cells 8A and 8B on the 8B side. The following hatch items were found in Pontoon G: The door handle wheel is loose to the shaft between cells 5A and 5B on the 5B side. The door handle wheel is loose to the shaft between cells 8C and 9C on the 9C side. The door handle wheel is loose to the shaft between cells 10C and 11C on the 11C side. One dog arm is not connected to the hub between cells 11C and 11D. Following items were found in Pontoon K: The door handle wheel is loose to the shaft between cells 4C-5C on the 5C side. Cell 4E has a 10"x6"x2" deep spall with one 4" length of exposed rebar in the southeast corner at the interface of the wall with the soffit. The door handle wheel is loose to the shaft between cells 5C-6C on the 6C side.

Gravel ballast was found in several cells of pontoons A, E, F, G, I, K, L, M, N, and Q.

### ***Conclusions***

The bridge crew keeps the pontoons remarkably dry despite the harsh elements at Lake Washington. The pontoons are maintained as dry and watertight as their design and condition allows them to be.

No significant deficiencies were found in any of the pontoon cells. Several of the ceilings and walls had hairline leaching cracks, which is typical for concrete structures. None of these cracks appeared open or actively leaking.

The interior water tight doors are in good shape and only one defect noted would affect the water-tightness of the doors (Pontoon G, Door 11C-11D, disconnected dog arm). All interior doors that were opened during inspection were operable and in the proper closed tight position.

Gravel ballast was added during construction to certain pontoon cells to adjust the flotation and alignment.

The cells that contained measurable water and gravel ballast in them are particularly difficult to pump dry, as water must migrate laterally through the gravel to reach the pump head. Since the water is only in the void space of the gravel, water depths measured in the gravel ballast are much deeper than what the same amount of water would measure in a pontoon cell without the gravel ballast.

Bridge Preservation Water Tight Inspection records as well as the Historical Pumping Records show that some of the cells below the hatches appear to have a history of traces of water, which might be caused by leaky seals.

Two other locations have a history of traces of water, Pontoon A, Cell 5D and Pontoon G, Cell 6A. Since the 6" of water noted and removed in the 2005 pumping record in Pontoon A, Cell 5D, there has been no other water found in the cell. Pontoon G, Cell 6A continues to have a pumping history with 1.5" of water found during the inspection, 1" of water removed in 2007, 4" of water removed in 2006. This cell will be monitored annually to see if water continues to accumulate.

### ***Recommendations***

Continue regular inspection and pumping of excess water from pontoon cells. Maintain down to a “Trace” level of water, except as necessary in the cells which contain water ballast. Document these actions and report annually to BPO at the end of each calendar year.

Starting in 2004, the Bridge Preservation office supplied the maintenance crew with a tracking sheet to monitor and document water pumped out of pontoon cells. Figure 1 has an example of the tracking sheet; see Appendix D for complete list of pumping history.

Location		Date Noted	Depth of Water Found	Date Pumped	Depth of Water after Pumping	Gravel (Y or N)	Hours	Personnel
Pontoon	Cell							

**Figure 1. Example of water removal tracking sheet**

The following repairs have been added to the BPO Mobile Bridge Inspection Program (BPO repair reference number listed after each called out repair); see Figure 2 for definition of repair priorities

- Pontoon E, Cell 9A: Repair the hatch door between cells 9A and 9B (Priority 2 REPAIR #14401).
- Pontoon F, Cell 8B: Repair the loose door handle wheel/shaft connection at interior hatch 8A-8B (Priority 2 REPAIR #14401).
- Pontoon G, Cell 5A: Repair the loose door handle wheel/shaft connection at interior hatch 5A-5B (Priority 2 REPAIR #14405).
- Pontoon G, Cell 6A: Monitor the water level annually (Priority 4 REPAIR # 14407).
- Pontoon G, Cell 8C: Repair the loose door handle wheel/shaft connection at interior hatch 8C-9C (Priority 2 REPAIR #14405).
- Pontoon G, Cell 10C: Repair the loose door handle wheel/shaft connection at interior hatch 10C-11C (Priority 2 REPAIR #14405).
- Pontoon G, Cell 11C: Repair the disconnected dog arm. It has detached from the hub (Priority 1 REPAIR #14406).
- Pontoon K, Cell 4C: Repair the loose door handle wheel/shaft connection at interior hatch 4C-5C (Priority 2 REPAIR #14405).
- Pontoon K, Cell 4E: Repair the 10”x6”x2” deep spall (Priority 2 REPAIR #14403).
- Pontoon K, Cell 5C: Repair the loose door handle wheel/shaft connection at interior hatch 5C-6C (Priority 2 REPAIR #14405).

<b>Emergency Repair:</b>	Repair work requiring immediate action when structures are partially or completely closed.
<b>Urgent Repair:</b>	Repair work requiring prompt action and must be completed when structural details and bridge crews become available.
<b>Priority 1:</b>	Damage to primary structural, mechanical or electrical elements which directly affect: Public Safety, Reliability of Transportation System, Protecting Public Investments and Maintaining Legal Federal Mandates.
<b>Priority 2:</b>	Work should be accomplished within regular work schedule or programmed in the biennial work schedule.
<b>Priority 3:</b>	Generally a minor nonstructural or 'housekeeping' type of repair, which may evolve into a higher priority if not corrected.
<b>Priority 4:</b>	A condition that requires the structure to be monitored primarily by the bridge inspection teams, and may evolve into a higher priority.

**Figure 2. Repair Priority Matrix**

## **Appendix**

*Appendix A-Field Notes*

<u>PONTOON</u>	<u>CELL</u>	<u>COMMENTS</u>
A	1A	31" of Gravel Ballast
	1B	31" of Gravel Ballast
	1F	Trace of Water
	1H	32" of Gravel Ballast
	1I	1.5" of Water, 36" of Gravel Ballast
	2A	26" of Gravel Ballast
	2I	28" of Gravel Ballast
	3A	Trace of Water, 29" of Gravel Ballast
	3I	Trace of Water, 26" of Gravel Ballast
	4A	27" of Gravel Ballast
	4I	Trace of Water, 26" of Gravel Ballast
	5A	30" of Gravel Ballast
	5B	30" of Gravel Ballast
	5D	Trace of Water
	5E	Trace of Water
	5H	Trace of Water, 27" of Gravel Ballast
	5I	Trace of Water, 28" of Gravel Ballast

<u>PONTOON</u>	<u>CELL</u>	<u>COMMENTS</u>
E	8D	Trace of Water
	9A	Door 9A-9B Loose; Rattles When Shut

<u>PONTOON</u>	<u>CELL</u>	<u>COMMENTS</u>
F	7D	Trace of Water
	8A	Door 8A-8B Loose; wheel is loose on shaft

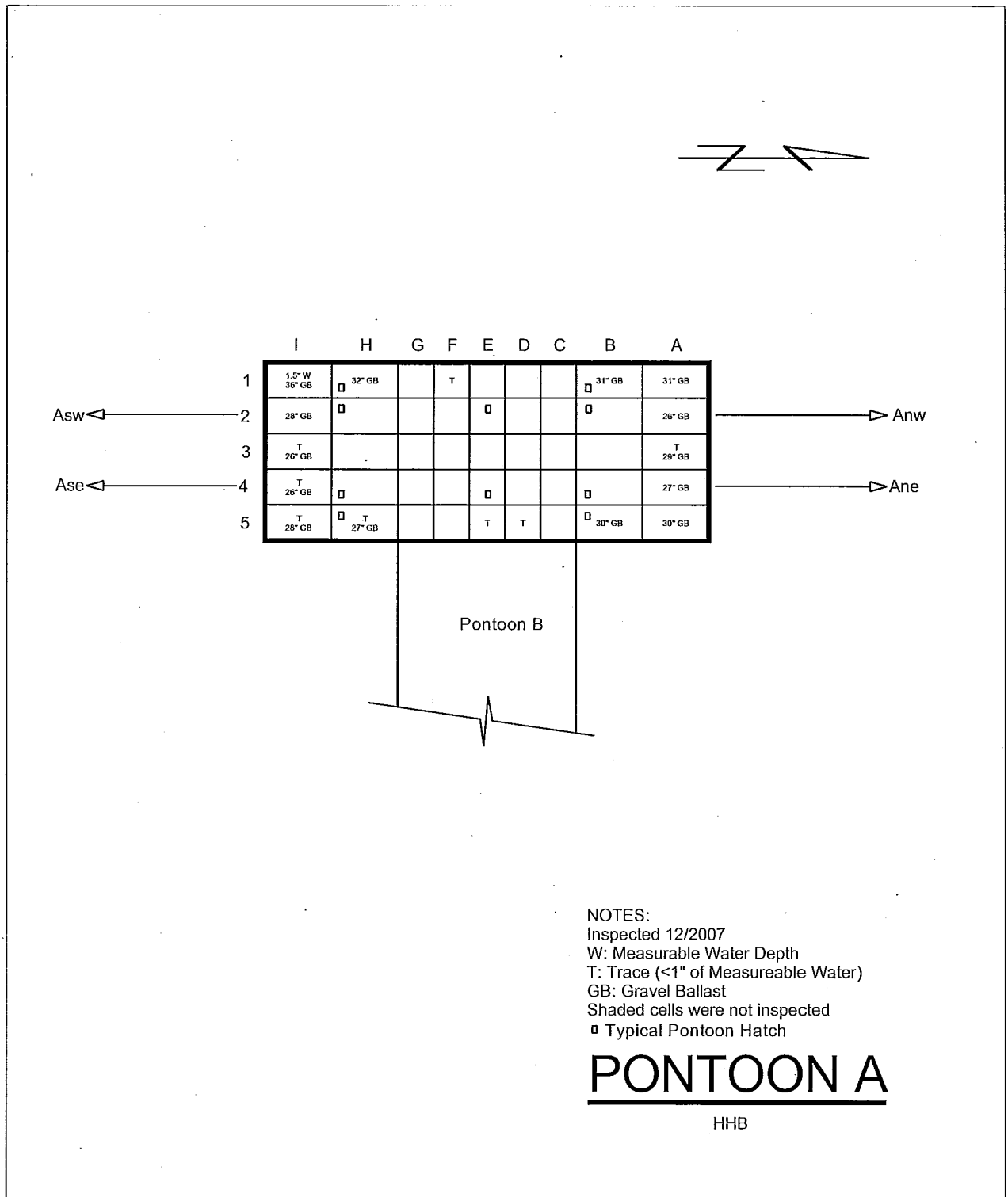
<u>PONTOON</u>	<u>CELL</u>	<u>COMMENTS</u>
G	2B	Trace of Water
	2C	Trace of Water
	2D	Trace of Water
	2E	Trace of Water, 10" of Gravel Ballast
	3D	Trace of Water
	4A	5" of Gravel Ballast
	4E	7" of Gravel Ballast
	5A	5A-5B wheel is loose on shaft
	6A	1.5" of Water
	6D	1.5" of Water
	7A	Trace of Water
	7B	Trace of Water
	7D	Trace of Water
	7E	Trace of Water
	8C	Door 8C-9C Loose; wheel is loose on shaft on 9C side
	9E	Trace of Water, 10" of Gravel Ballast
	10C	Door 10C-11C Loose; wheel is loose on shaft on 11C side
	11C	Door 11C-12C One dog leg is disconnected from hub.

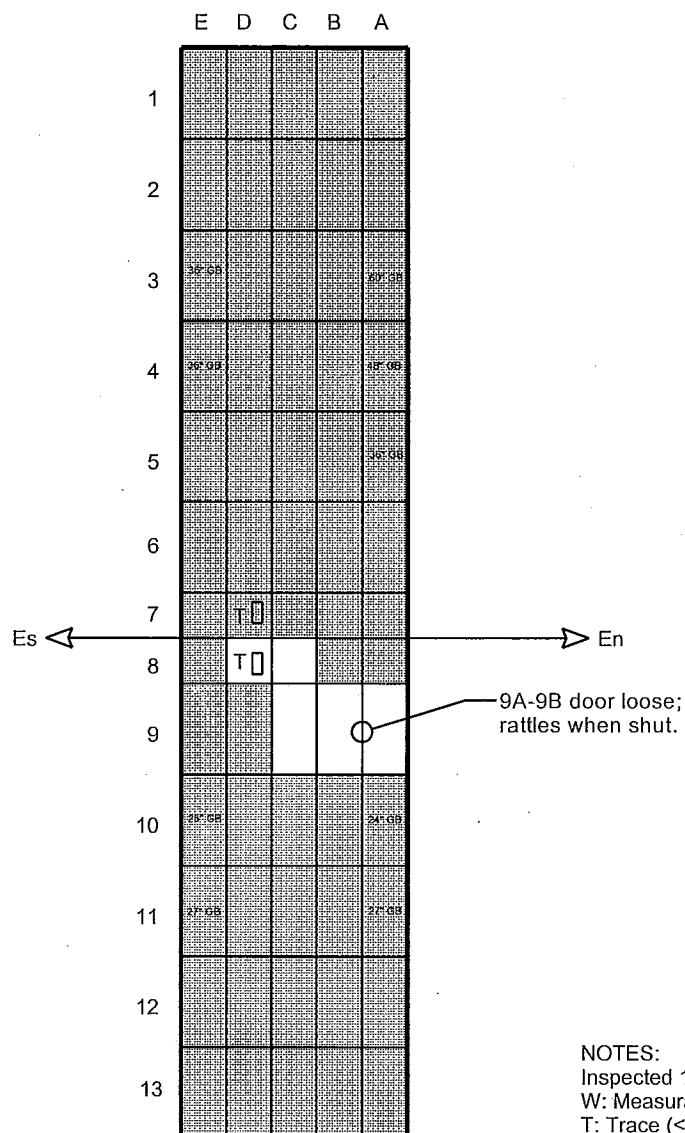
<b><u>PONTOON</u></b>	<b><u>CELL</u></b>	<b><u>COMMENTS</u></b>
I	11E	8" of Gravel Ballast
	3D	Trace of Water
	4A	10" of Gravel Ballast
	4E	12" of Gravel Ballast
	5B	Trace of Water
	5E	Trace of Water
	6D	Trace of Water
	7D	Trace of Water
	9A	12" of Gravel Ballast
	9E	12" of Gravel Ballast
<b><u>PONTOON</u></b>	<b><u>CELL</u></b>	<b><u>COMMENTS</u></b>
K	4A	14" of Gravel Ballast
	4C	4C-5C wheel is loose on shaft
	4E	10"x6"x2" spall w/4" rebar, 12" of Gravel Ballast
	5C	5C-6C wheel is loose on shaft
	6C	Trace of water
	6D	Trace of Water
	7A	Trace of Water
	9A	10" of Gravel Ballast
	9E	10" of Gravel Ballast
<b><u>PONTOON</u></b>	<b><u>CELL</u></b>	<b><u>COMMENTS</u></b>
L	4A	12" of Gravel Ballast
	4E	10" of Gravel Ballast
	9A	12" of Gravel Ballast
	9E	12" of Gravel Ballast
	10D	Trace of Water
<b><u>PONTOON</u></b>	<b><u>CELL</u></b>	<b><u>COMMENTS</u></b>
M	4A	8" of Gravel Ballast
	4E	10" of Gravel Ballast
	6D	Trace of Water
	9A	12" of Gravel Ballast
	9E	10" of Gravel Ballast
<b><u>PONTOON</u></b>	<b><u>CELL</u></b>	<b><u>COMMENT</u></b>
N	4A	12" of Gravel Ballast
	4E	8" of Gravel Ballast
	9A	15" of Gravel Ballast
	9E	8" of Gravel Ballast

<u>PONTOON</u>	<u>CELL</u>	<u>COMMENTS</u>
O	4A	12" of Gravel Ballast
	4E	12" of Gravel Ballast
	9A	12" of Gravel Ballast
	9E	24" of Gravel Ballast
	11B	Trace of Water
	11D	Trace of Water

<u>PONTOON</u>	<u>CELL</u>	<u>COMMENTS</u>
Q	3A	60" of Gravel Ballast
	3E	48" of Gravel Ballast
	4A	60" of Gravel Ballast
	4E	46" of Gravel Ballast
	5A	54" of Gravel Ballast
	5E	36" of Gravel Ballast
	8A	42" of Gravel Ballast
	8E	38" of Gravel Ballast
	9A	42" of Gravel Ballast
	9E	38" of Gravel Ballast
	10A	24" of Gravel Ballast
	10E	30" of Gravel Ballast
	11A	33" of Gravel Ballast
	11E	23" of Gravel Ballast

## ***Appendix B-Pontoon Layouts***

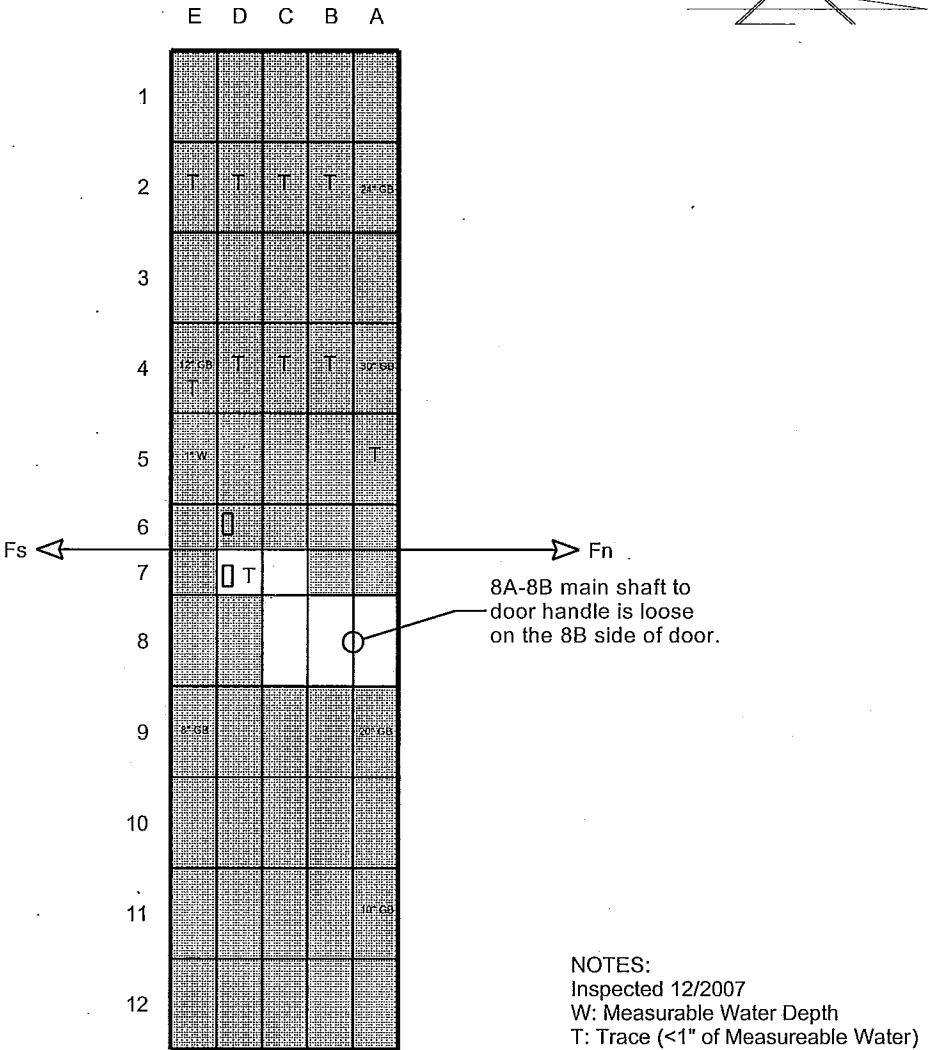




NOTES:  
 Inspected 12/2007  
 W: Measurable Water Depth  
 T: Trace (<1" of Measureable Water)  
 GB: Gravel Ballast  
 Shaded cells were not inspected  
 □ Typical Pontoon Hatch

## PONTON E

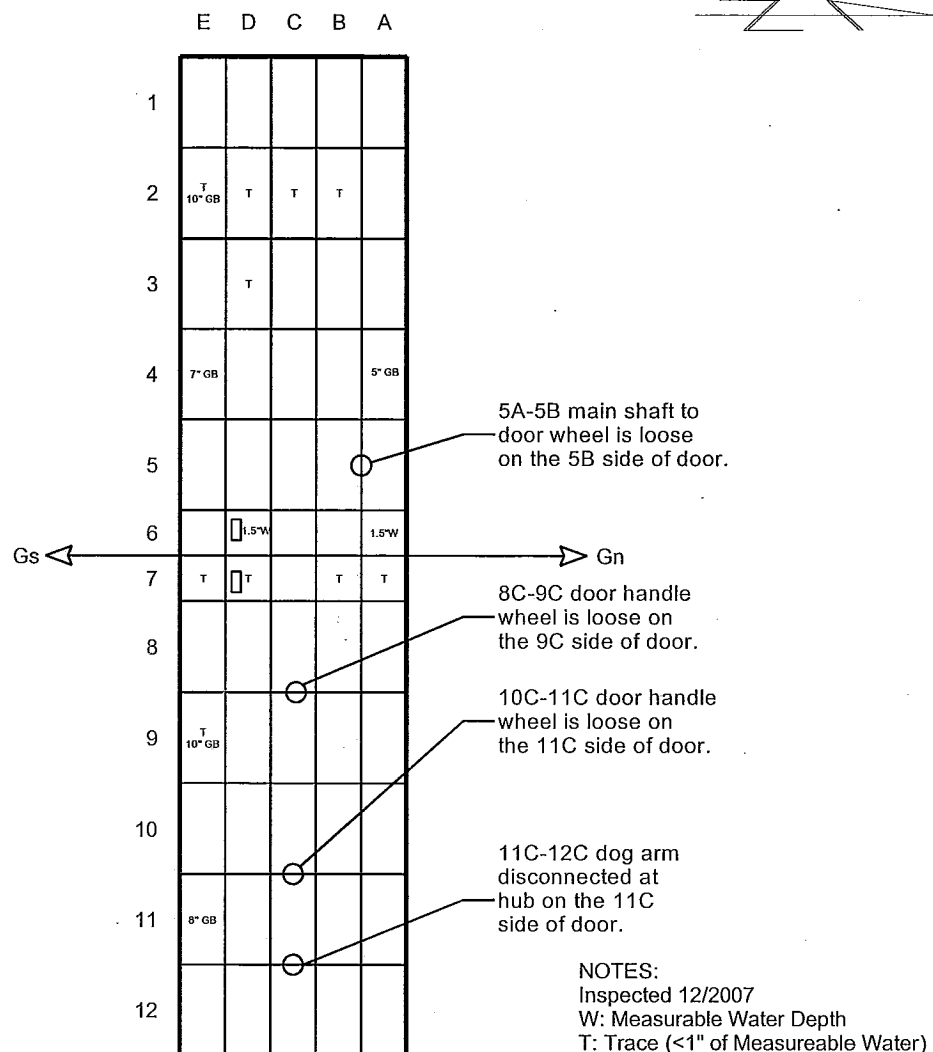
HHB



NOTES:  
Inspected 12/2007  
W: Measurable Water Depth  
T: Trace (<1" of Measureable Water)  
GB: Gravel Ballast  
Shaded cells were not inspected  
□ Typical Pontoon Hatch

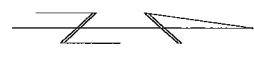
**PONTOON F**

HHB



# PONTOON G

HHB



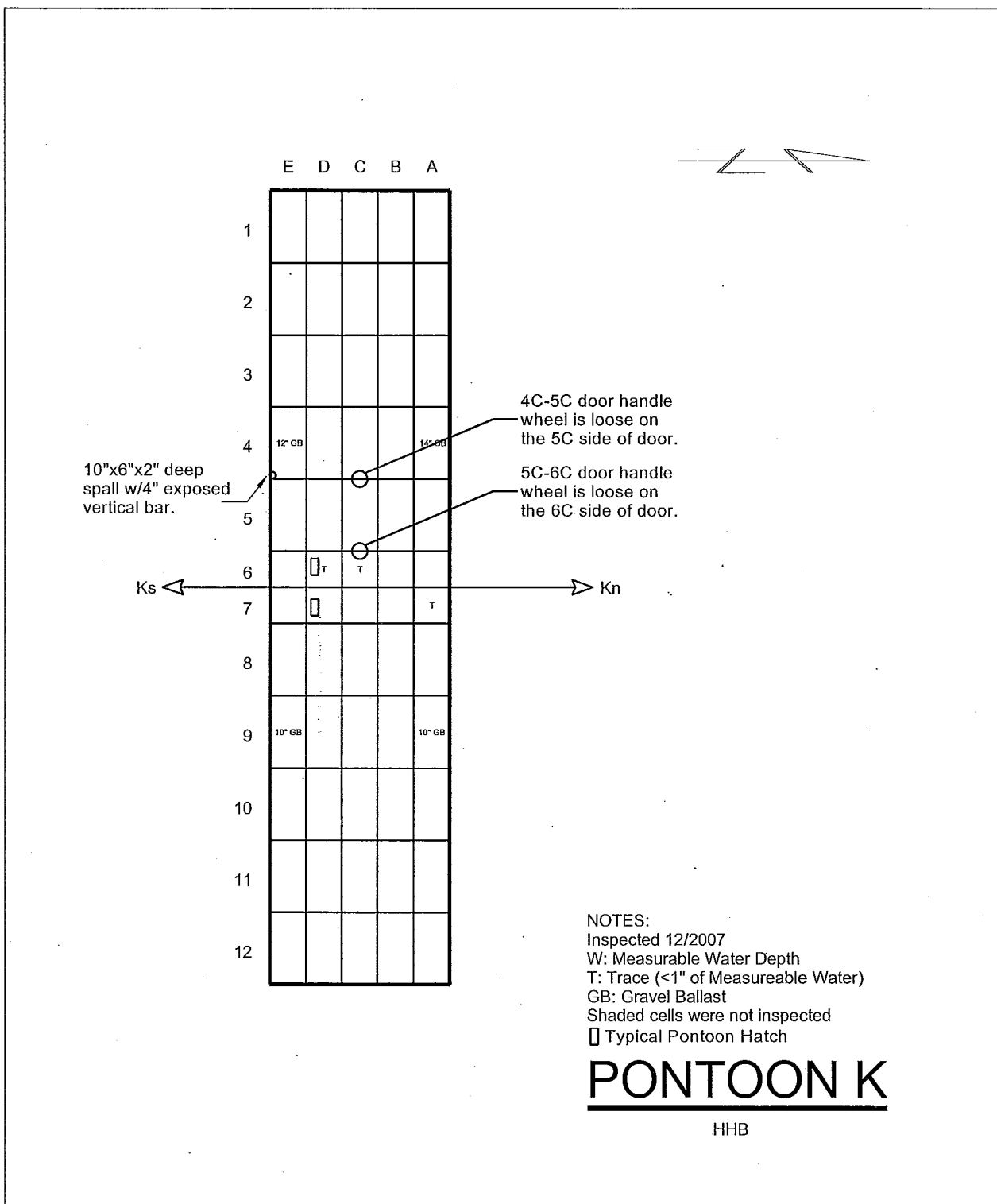
	E	D	C	B	A
1					
2					
3		T			
4	12" GB				10" GB
5	T			T	
6		□ T			
7		□ T			
8					
9	12" GB				12" GB
10					
11					
12					

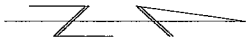
Is ← → In

NOTES:  
 Inspected 12/2007  
 W: Measurable Water Depth  
 T: Trace (<1" of Measureable Water)  
 GB: Gravel Ballast  
 Shaded cells were not inspected  
 □ Typical Pontoon Hatch

**PONTOON I**

HHB





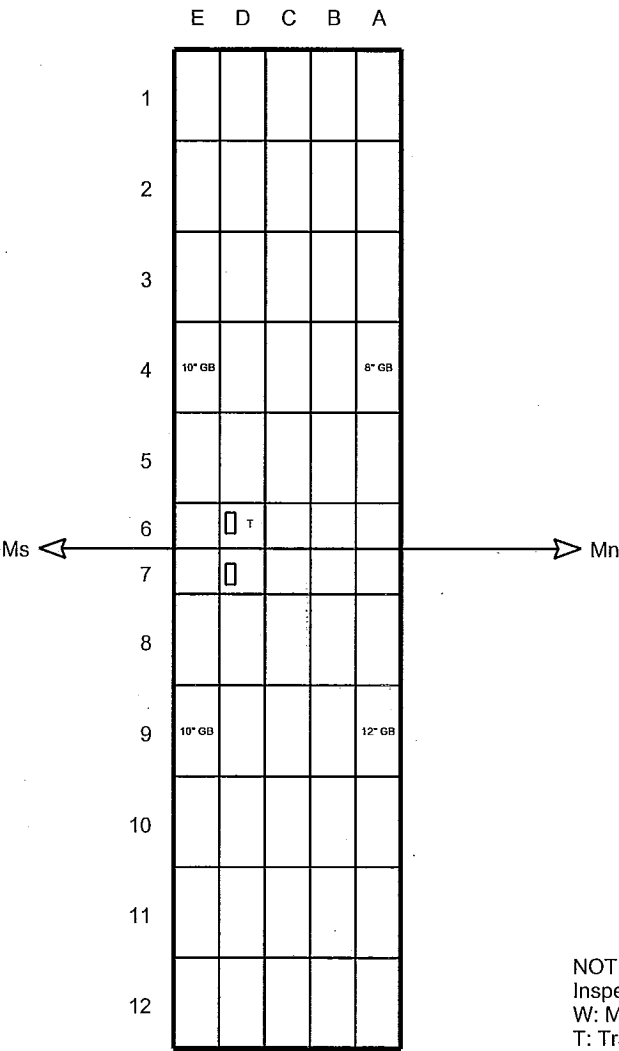
	E	D	C	B	A
1					
2					
3					
4	10" GB				12" GB
5					
6		□			
7		□			
8					
9	12" GB				12" GB
10		T			
11					
12					

Ls ← → Ln

NOTES:  
 Inspected 12/2007  
 W: Measurable Water Depth  
 T: Trace (<1" of Measureable Water)  
 GB: Gravel Ballast  
 Shaded cells were not inspected  
 □ Typical Pontoon Hatch

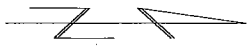
**PONTOON L**

HHB



NOTES:  
Inspected 12/2007  
W: Measurable Water Depth  
T: Trace (<1" of Measureable Water)  
GB: Gravel Ballast  
Shaded cells were not inspected  
□ Typical Pontoon Hatch

**PONTOON M**  
HHB



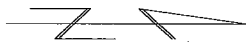
	E	D	C	B	A
1					
2					
3					
4	8" GB				12" GB
5					
6		□			
7		□			
8					
9	8" GB				15" GB
10					
11					
12					

← Ns      → Nn

NOTES:  
 Inspected 12/2007  
 W: Measurable Water Depth  
 T: Trace (<1" of Measureable Water)  
 GB: Gravel Ballast  
 Shaded cells were not inspected  
 □ Typical Pontoon Hatch

**PONTOON N**

HHB



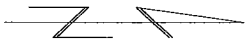
	E	D	C	B	A
1					
2					
3					
4	12" GB				12" GB
5					
6		□			
7		□			
8					
9	24" GB				12" GB
10					
11		T		T	
12					

Os ← → On

NOTES:  
 Inspected 12/2007  
 W: Measurable Water Depth  
 T: Trace (<1" of Measureable Water)  
 GB: Gravel Ballast  
 Shaded cells were not inspected  
 □ Typical Pontoon Hatch

**PONTOON O**

HHB



	E	D	C	B	A
1					
2					
3	48" GB				60" GB
4	46" GB				60" GB
5	36" GB				54" GB
6		□			
7		□			
8	38" GB				42" GB
9	38" GB				42" GB
10	30" GB				24" GB
11	23" GB				33" GB
12					
13					

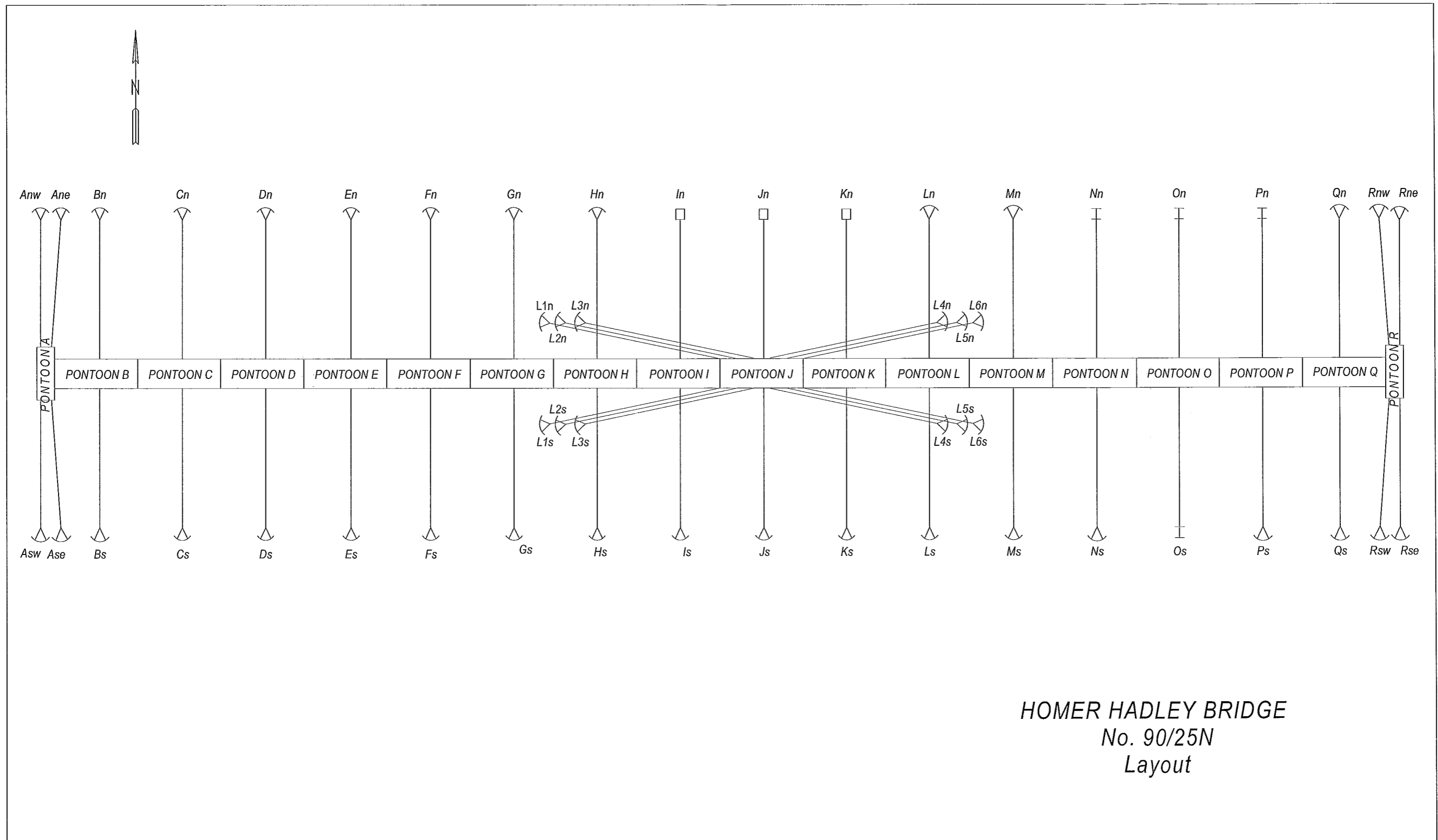
Qs ← → Qn

NOTES:  
 Inspected 12/2007  
 W: Measurable Water Depth  
 T: Trace (<1" of Measureable Water)  
 GB: Gravel Ballast  
 Shaded cells were not inspected  
 □ Typical Pontoon Hatch

## PONTOON Q

HHB

## ***Appendix C-Bridge Layout***



### ***Appendix D-Pumping History***

This is the historical pumping record list for all cells. Some cells may not have been inspected during this inspection cycle. See page 1 for a list of the pontoons inspected during this cycle.

Note: Pumping records available from maintenance are shown below. Trace amount of water is standing water in the cell less than one inch deep.

Location		Date	Depth of	Date	Depth of	Gravel		
Pontoon	Cell	Noted	Water Found	Pumped	Water after pumping	(Y or N)	Hours	Personnel
A	01I	10/12/2006	3"	10/26/2006	TRACE	Y	3	JM MT
A	05D	10/12/2006	3"	10/26/2006	TRACE	N	1	JM MT
A	05E	1/13/2005	6"	1/13/2005	TRACE	N		
D	07D	5/30/2007	2.5"	5/30/2007	0	N	2	Tachell/Aye
D	08D	5/30/2007	2.5	5/30/2007	0	N	2	Tachell/Aye
E	07D	6/8/2006	1"	7/13/2006	TRACE	N	1	JM
E	11A	5/30/2007	1.5	5/30/2007	0	Y	1	Tachell/Rockett
F	06D	1/12/2005	3"	1/12/2005	TRACE	N		
F	07D	4/16/2007	1	4/17/2007	0	N	1	Malloy/Murphy
G	06A	4/16/2007	1	4/17/2007	0	N	1	Malloy/Murphy
G	06A	8/2/2006	2"	10/4/2006	TRACE	N		DA JA
G	06A	6/8/2006	2"	6/23/2006	TRACE	N	5	JM
G	06A	7/8/2003	1-1/2"	7/8/2003	TRACE	N		
G	06D	5/30/2007	2	5/30/2007	0	N	2	Tachell/Aye
G	06D	4/16/2007	1	4/17/2007	0	N	1	Malloy/Murphy
G	07D	1/4/2005	4"	1/4/2005	TRACE	N		
H	06D	5/30/2007	3	6/1/2007	0	N	2.5	Tachell/Aye
H	06D	7/5/2006	1"	7/13/2006	TRACE	N	1	JM
H	06D	1/4/2005	3"	1/4/2005	TRACE	N		
H	07D	5/30/2007	3	6/1/2007	0	N	2.5	Tachell/Aye
I	05D	6/1/2007	1	6/7/2007	0	N	1	Tachell/Rockett
I	06D	6/1/2007	2	6/7/2007	0	N	2	Tachell/Rockett
K	06D	6/8/2006	1"	7/13/2006	TRACE	N	2	JM
K	07A	4/23/2007	1	5/17/2007	0	N	1	Murphy/Tachell
L	07D	6/23/2006	1"	7/13/2006	TRACE	N	2	JM
L	10D	4/23/2007	0.25	5/17/2007	0	N	0.5	Murphy/Tachell
M	06D	6/8/2006	1/2"	7/13/2006	TRACE	N	1	JM
M	07D	7/5/2006	1"	7/13/2006	TRACE	N	1	JM
N	06D	4/23/2007	1	5/11/2007	0	N	1.5	Tachell/Rockett
N	07D	3/31/2004	3"	3/31/2004	TRACE	N		
P	07D	4/16/2007	1	4/17/2007	0	N	1	Malloy/Murphy
P	07D	1/12/2005	2"	1/12/2005	TRACE	N		
P	08D	4/16/2007	1	4/17/2007	0	N	1	Malloy/Murphy

Location		Date Noted	Depth of Water Found	Date Pumped	Depth of Water after pumping	Gravel (Y or N)	Hours	Personnel
Pontoon	Cell							
R	01B	5/30/2007	2	6/2/2007	0	Y	2	Tachell/Aye
R	01G	1/13/2005	3"	1/13/2005	TRACE	N		
R	02B	5/30/2007	2	6/2/2007	0	Y	2	Tachell/Aye
R	02B	7/5/2006	1/2"	7/14/2006	TRACE	Y	2	JM
R	02H	5/30/2007	1	6/2/2007	0	Y	1	Tachell/Aye
R	03A	5/30/2007	3	6/1/2007	0	Y	2.5	Tachell/Aye